Physico-chemical analysis of Water of Satna, District (M.P.)

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***Abstract*: Water is one of the most important source of all natural resources known on earth. It is important to all living organisms, human health, food production and economic development. Water is a vital resource for human survival but due to increase population, agricultural practices, industrialization, man- made activities, water is being highly polluted with different pollutants. Due to use of contaminated drinking water human population suffers from water borne disease. So that it is necessary to study the physico-chemical characteristics of water quality parameters.Parameters that may be tested include temperature, pH, turbidity, salinity, nitrates, phosphates, alkalinity, TDS, hardness, DO, BOD, COD, used for testing of water quality.**

***Keywords*: Natural resources, pollutants, water quality, physico-chemical Parameter.**

INTRODUCTION

Water is one of the most important and abundant compounds of the ecosystem. All living organisms on the earth need water for their survival and growth. Earth is the planet having about 70 % water. Increase in urbanization, industrialization, agriculture activity and various human activities have increased the pollution of surface water & ground water. Various treatment methods are adopted to raise the quality of drinking water.

Pollution of water is a serious problem in India. As almost 70 percent of surface water resources and groundwater reserves are contaminated by biological, toxic, organic, and inorganic pollutants.most pollutants are introduced into the environment as sewage, agricultural waste, domestic waste, industrial waste, accidental discharge and as compounds used to protect plants and animals.

Due to growth of population, agriculture, and industries, demand for domestic water has increased many times during the last few years. Improper waste disposal and over exploitation of resources has affected the quality, not only of tap water, but also of ground water. In many cases, these sources have been rendered unsafe for human consumption as well as for other activities, such as irrigation and industrial needs.
Organisms, ecological systems, human health, food production and economic development. The safety of drinking water is important for the health. The safety of drinking water is affected by various contaminants which included chemical and microbiological. Such contaminants cause serious health problems. Due to these contaminants quality of drinking water becomes poor. Sometimes such poor quality water causes many diseases in the humans, so that quality of water must be tested for both the chemical as well as for the microbial contaminants.

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Groundwater is used for domestic and industrial water supply and also for irrigation purposes in all over the world. In the last few decades, there has been a tremendous increase in the demand for fresh water due to rapid growth of population and the accelerated pace of industrialization. According to WHO organization, about 80% of all the diseases in human beings are caused by polluted water. Once the groundwater is contaminated, its quality cannot be restored back easily and means to protect it. Water quality analysis one of the most effective tools to communicate information on the quality of water.
In this study we aim to analyze the physico-chemical properties of tap water collected from different areas of Satna district.

MATERIALS AND METHODS

In order to investigate the water quality from different areas of Satna district were chosen for collection of sample during jan 2020. The samples were collected in sterile glass bottles, brought to the laboratory, processed within 1-3 hrs and stored at −20°C for further analysis. Before sampling, all the bottles were washed thoroughly with the detergent, tap water and ethanol then distilled water. Chemical parameters were determined by using standard methods immediately after taking them into the laboratory.
The locations and sources of water samples and parameters are given in Table 1 & 2.

TABLE 1: WATER SAMPLES FROM DIFFERENT PLACES IN SATNA DISTRICT (M.P.)(INDIA)

S.No.	SAMPLE SOURCE	SAMPLE SITE (SATNA District M.P)
1	TAP WATER	CIVIL LINES
2	TAP WATER	MUKHTYARGANJ
3	TAP WATER	MAHARANA PRATAP NAGAR
4	TAP WATER	BHARHUT NAGAR
5	TAP WATER	GHANSHYAM VIHAR COLONY
6	TAP WATER	RAJENDRA NAGAR
7	TAP WATER	SHERGANJ

TABLE 2: DIFFERENT PARAMETERS FOR THE ANALYSIS OF WATER SAMPLE

S. NO.	STUDIED PARAMETER	METHOD USED
1	pH	RECORDED BY pH METER
2	TEMPERATURE	THERMOMETER
3	HARDNESS	EDTA METHOD
4	TDS	TDS METER
5	B.O.D.	TITROMETRIC
6	C.O.D	TITROMETRIC
7	D.O.	TITROMETRIC

DETERMINATION OF PH AND WATER TEMPERATURE

The pH and temperature of water samples were measured at the time of collection. The pH of all water samples was measured by using pH meter .The calibration was carried out with three standard buffer solution of pH4.3 ,7.0 and 9.2. The pH of the sample should lie between 7.52 to 7.82. The sample temperature was determined at the same time by portable thermometer.

TOTAL HARDNESS

Hardness of water is an important parameter in determining the suitability of water for domestic and industrial uses. Total hardness of water samples were carried out by using titration method with EDTA solution. Water sample with buffer solution (10pH) was followed by the addition of 1 to 2 drops of indicator (EBT). Then, this solution was titrated against EDTA solution from burette and at the end point reddish to blue color obtained. The degree of hardness of drinking water has been classified with CaCO3 concentration as follows: Soft -0-60mg/l, Medium - 60-120 mg/l, Hard - 120-180 mg/l, Very hard - >180 mg/l.

TOTAL DISSOLVED SOLIDS (TDS)

The amount of inorganic salts of calcium, magnesium, sodium etc. and small proportion of organic matter present in the water are known as Total dissolved solids (TDS) .The range of TDS values ranging from < 10 ppm to >1500 ppm. Solids may affect the quality of water. The TDS of all water samples were identified at room temperature by using TDS meter.

CHEMICAL OXYGEN DEMAND (COD)

Chemical Oxygen Demand is the amount of oxygen required for the chemical oxidation of organic matter with the help of strong chemical oxidants .High COD may cause oxygen depletion on account of decomposition of microbes to a level detrimental to aquatic life. The measure of Chemical Oxygen Demand determines the quantities of organic matter found in the water. COD is useful as an indicator of organic pollution in surface water. Chemical oxygen demand (COD) of all water samples were identified by using dichromate method.

BIOLOGICAL OXYGEN DEMAND (BOD)

Biological Oxygen Demand is a measure of the oxygen in the water that is required by the aerobic organisms. The biodegradation of organic materials exerts oxygen level in the water and increases the biochemical oxygen demand. Biological Oxygen Demand is a measure of organic material contamination in the water. Biological Oxygen Demand specified in (mg/L). test for Biological Oxygen Demand is conducted over a five-day period. Biochemical oxygen demand (BOD) was identified by using alkali azide method.

DISSOLVED OXYGEN (DO)

Dissolved oxygen is the most important indicator of the health of water and its capacity to support a balanced aquatic ecosystem of plants and animals. Warm water released from industrial outlets, flowages or storm sewers can also reduce dissolved oxygen levels. Its deficiency directly affects the ecosystem of a river due to bioaccumulation and biomagnifications. This test was carried out by titrating given water sample with silver nitrate solution. The end point was yellow to bricks redcolour. Dissolved oxygen (DO) of water samples were carried out by using titrimetric method.

TABLE 3: RESULTS OF TAP WATER ANALYSIS

S.No.	Sample site	Temperature (^{O} C)	pH	Hardness (PPM)	TDS (mg/L)	DO	BOD	COD
1	CIVIL LINES	20	7.82	210	243	3.8	46	219
2	MUKHTIYARGANJ	19	8.73	220	404	4.3	62	258
3	MAHARANA PRATAP NAGAR	19	8.38	260	525	4.6	54	281
4	BHARHUT NAGAR	20	7.56	250	445	4.1	52	158
5	GHANSHYAM VIHAR COLONY	20	7.32	210	515	3.4	59	253
6	RAJENDRA NAGAR	19	8.86	220	435	3.7	56	216
7	SHERGANJ	19	7.87	230	445	3.8	50	274

CONCLUSION

Increasing population and its necessities have lead to the deterioration of surface and sub-surface water. The modern civilization and urbanization frequently discharging industrial effluent, domestic sewage and solid waste dump. The cause of ground water gets pollute and create health problems. Once the groundwater is contaminated, its quality cannot be restored by stopping the pollutants from the source it therefore becomes imperative to regularly monitor the quality of groundwater and to device ways and means to protect it. So before using of water we should investigate qualitative analysis of some physic chemical parameters of Ground water. This may be considered as reference for the society to get cautious about the impending deterioration of their environment and health Increasing population and its necessities have lead to the deterioration of surface and sub-surface water. The quality of water monitoring by various physico-chemical parameters. It is necessary to determine and maintain the quality of water. The present study bring an acute awareness among the people about the quality of water. The individual and the community can help to minimize water pollution by housekeeping and management practices. The effects of water pollution are not only devastating to people, but also to destroy aquatic life .Water quality is dependent on the type of the pollutant added and the nature of mineral found in the water. In this study result of water quality estimation seems that the most of the water quality parameters slightly higher than the standard water quality parameters.

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